Dual Feed DC Telecom Power Supply

Installation and User's Guide

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1 Introduction

Welcome to the *Dual Feed DC Telecom Power Supply User's Guide.* This guide contains information about the installation and use of Continuous Computing Corporation's 100W, 150W, and 350W Dual Feed DC Telecom Power Supplies.

This guide includes the following information related to the 100W, 150W, and 350W Dual Feed DC Telecom Power Supplies:
- Unpacking, installing, and starting up
- Grounding your system
- Troubleshooting
- Connector usage and specifications

Description

The Continuous Computing Telecom Power Supply offers 100, 150, or 350 watts of Hot Swappable, load-sharing power for a CompactPCI system. The Power Supply is designed for the Central Office, with dual input feeds and –48V DC input. Typical systems combine two Supplies to provide redundant power. Each Power Supply also provides a standby power output for use by a Continuous Control Node (CCN).

Features of the Dual Feed DC Telecom Power Supply include:

- **Hot Swap and Load Sharing**
  The Power Supply is designed for redundant operation. A failed Power Supply can be replaced without application downtime. Load sharing ensures that supplies run cooler, leading to increased system reliability.
- **Standby Power**
  Standby power provides an output that is always on to power a Continuous Control Node. This enables remote power cycling and system diagnostics even when the Power Supply is off.
- **Over Temperature and Short Circuit Protection**
  Protection features reduce the possibility of hardware damage during extreme temperatures or fault conditions.
- **Remote Sense on +5 and +3.3V**
  Remote sense provides high-quality power to critical system components.
- **Dual Input Feeds**
  Dual power feeds allow the system to continue running even if one feed drops out.
- **6U CompactPCI Form-Factor**
  Standard 6U form-factor allows for easy integration into CompactPCI system without awkward divider rails.

The Telecom Power Supply is a Basic Hot Swap device. PICMG 2.1 R1.0 describes Basic Hot Swap as a board powered and enabled for access by the PCI bus in configuration space only upon insertion. The board's configuration space is not yet initialized. You must initiate software connection at the system console. The power circuitry is controlled so that inserting in or extracting from a live redundant system will not cause any electrical damage. If the system is not redundant, it must be halted before servicing.

Using This Guide

This guide is written for computer technicians and hardware and software engineers.

It is assumed that the user of the Power Supply is:

- Familiar with the handling of ESD-sensitive electronic equipment.
- Standard -48V wiring techniques and safety precautions.

Typographic Conventions

A summary of the typographic conventions used in this guide is listed in Table 1 below.

Typeface/Symbol	Meaning	Example
AaBbCc123	The names of commands, files and directories; on-screen computer output	Edit your `.login` file. At the `ok` prompt….
AaBbCc123	What you type, contrasted with on-screen computer output	To turn the unit on, type **on** at the `ccpu>` prompt. i.e., `ccpu>`:**on**
<***AaBbCc123***>	Command-line placeholder or token to be replaced with a real name or value (do not type brackets)	To delete a file, type **rm** <***filename***>.
[**AaBbCc123**]	Optional argument (do not type brackets)	[**help**] **dir** [<***filename***>]
{<***a***> <***b***>}	Required argument (do not type brackets)	{<***na***> <***cmd***>} **grade** {**a**, **b**, **c**, **d**, **f**}
AaBbCc123	Book titles, new words or terms, or words to be emphasized	• This manual is used in conjunction with the *SPARCengine CP1500 User's Manual.* • You *must* be grounded to avoid ESD damage to the equipment.
ABC	Acronyms	Locate the On / Off toggle switch on the CCN front panel.
⚠	Caution	Failure to heed the instructions that follow the Caution symbol may result in damage to the equipment.

Table 1   **Typographic conventions**

Definitions of Terms

Power Supply	Refers to the larger card installed in the front of the system. Power Supply also refers to the larger card and Power Input Module as a unit.
Power Input Module	Refers to the interface module installed at the back of the system.
Continuous Control Node (CCN)	Refers to the module that monitors and controls a compute node in a CompactPCI system.

Power Supply Widths

Power Supply	Width
100W	1 slot (4HP)
150W	1 ½ slots (6HP)
350W	2 slots (8HP)

Table 2   **Power Supply slot widths**

System Block Diagram
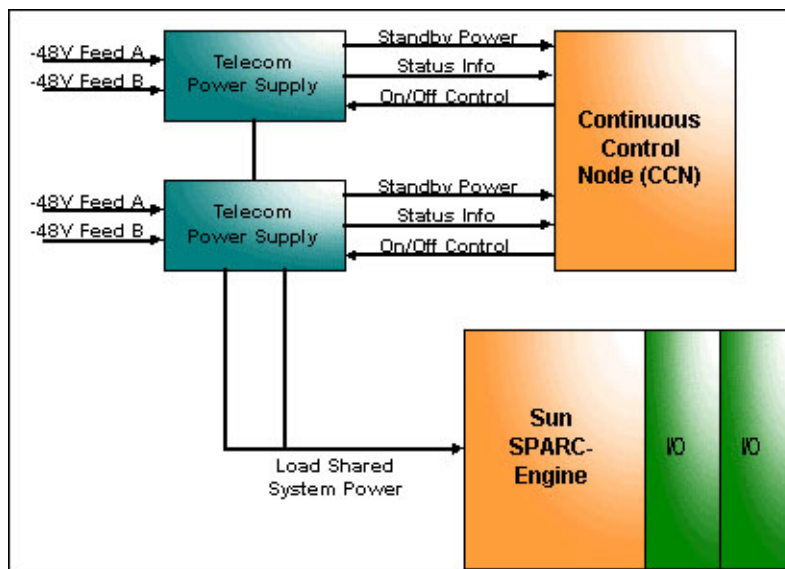
Figure 1   **System block diagram**

Photos

Feed A & B fuses

Alarm/Standby (STBY) power fuse
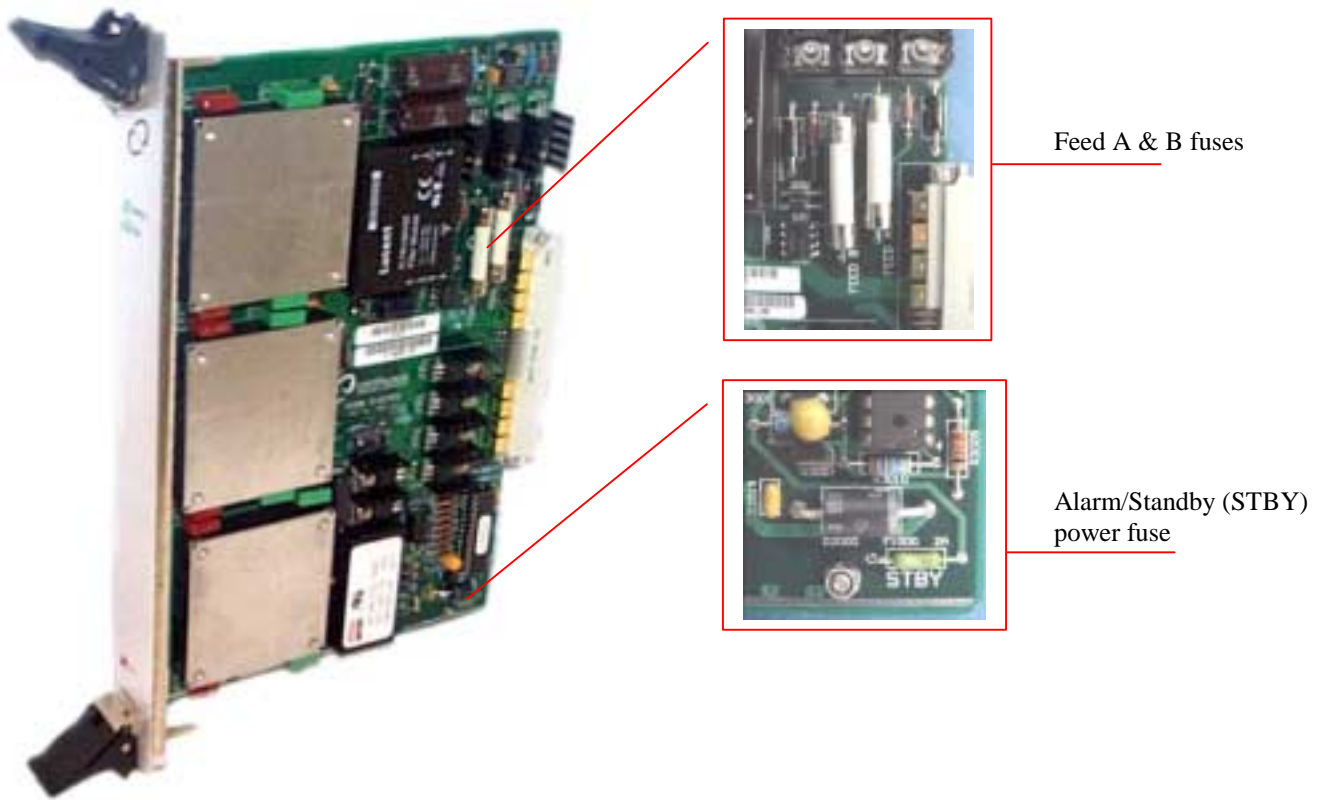
Figure 2   100W Dual Feed DC Telecom Power Supply

Feed A & B fuses

Alarm/Standby (STBY) power fuse
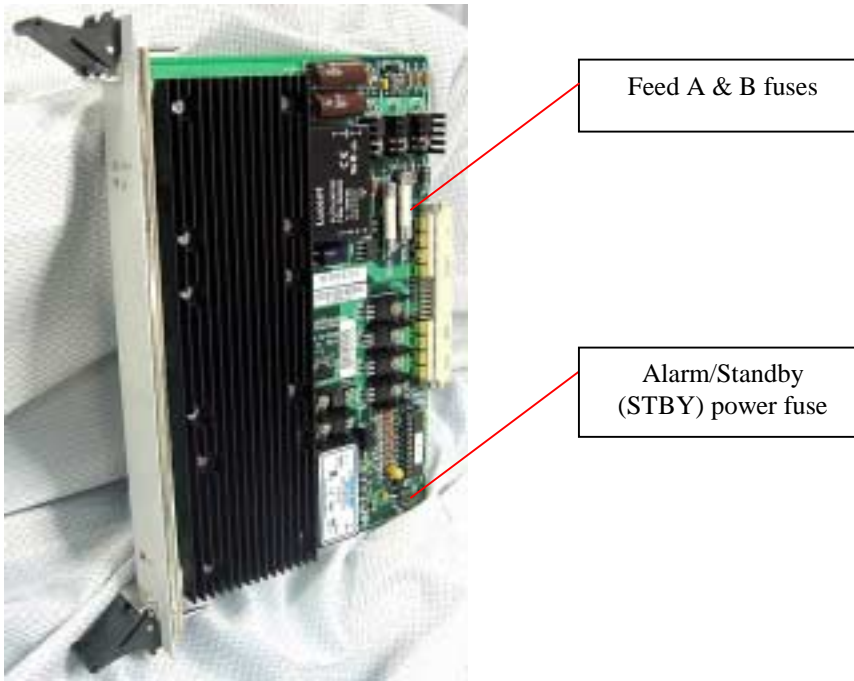
Figure 3   **150W Dual Feed DC Telecom Power Supply**

Feed A & B fuses

Alarm/Standby (STBY) power fuse
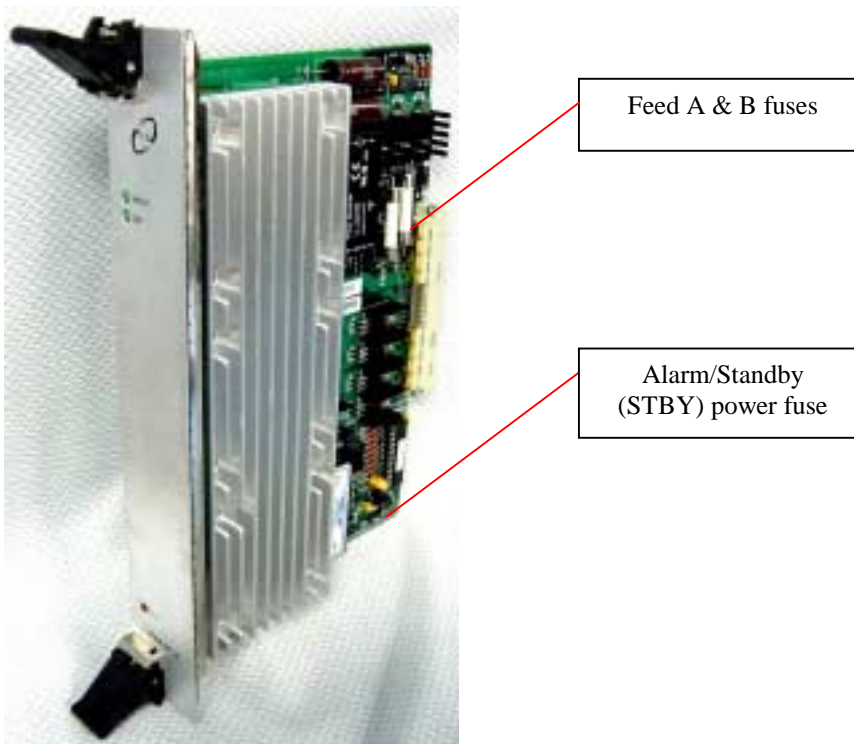
Figure 4   **350W Dual Feed DC Telecom Power Supply**

2 Unpacking, Installing, and Starting Up

Electrostatic Discharge (ESD)

> ⚠ **Caution – The Power Supply contains electronic components that are extremely sensitive to static electricity. Ordinary amounts of static from clothing and the surrounding environment may destroy components.**

What to do

- Use an antistatic mat.
- Use an antistatic wrist or foot strap.

Storage

- If the Power Supply is to be stored before unpacking, see Table 8 for environmental storage specifications.

Unpacking

> ⚠ **Caution – Always maintain an ESD-safe environment when handling the Power Supply. It contains many components that can be destroyed by ESD.**

- Inspect the shipping container for any in-transit damage and report it to shipping agent if necessary.
- Carefully unpack the Power Supply from its shipping container.

Installing the Power Supply

> ⚠ **Caution – You may only install the Power Supply in a slot specifically provided for it by Continuous Computing. The Power Supply is not interchangeable with supplies from other manufacturers, *even if they use the same connector.***

1. Slide the card into its slot in the system chassis. As the card's ejector latches engage the chassis, apply forward pressure while pushing the ejector latch handles toward each other. See Figure 5 for an illustration of Power Supply installation.

2. When properly installed, the connectors of each card will be fully engaged with the chassis' midplane. The Power Supply's front panel will sit flush with the front panels of the other cards.

3. Install and tighten the captive screw (supplied with the Power Supply) of each ejector latch handle to secure the card to the system chassis.
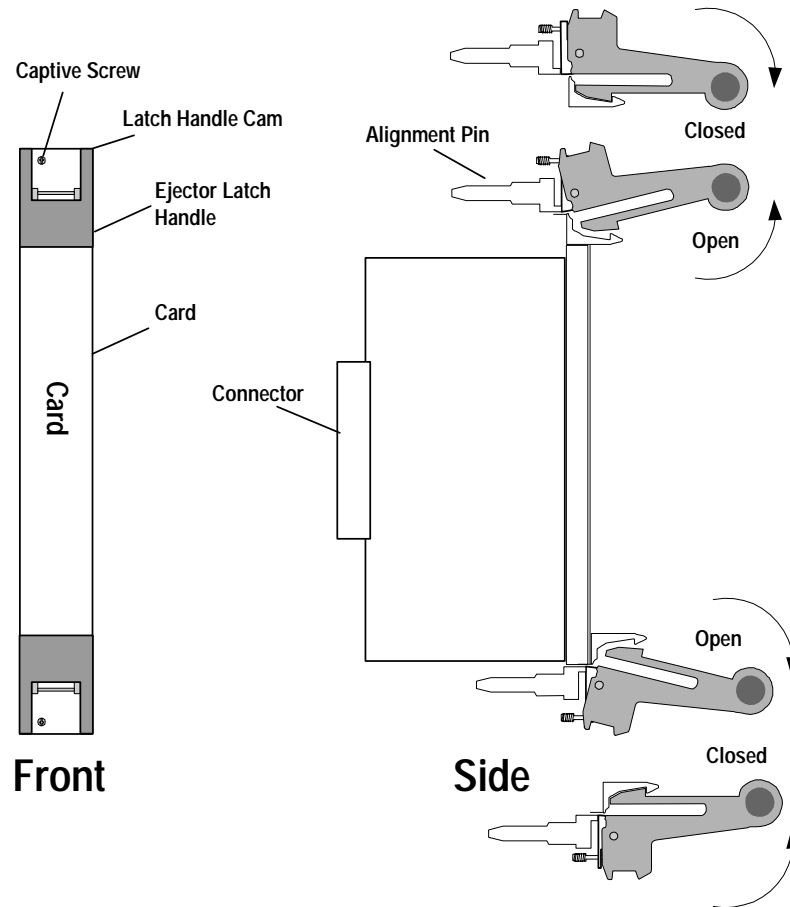
Figure 5   Card installation and removal

Installing the Power Input Module

1. Connect the Power Input Module's 6-pin connector to the midplane.
   Note: There are two available midplane options. Each has a 6-pin connector. See Figure 6 for location details.

Two available midplane options
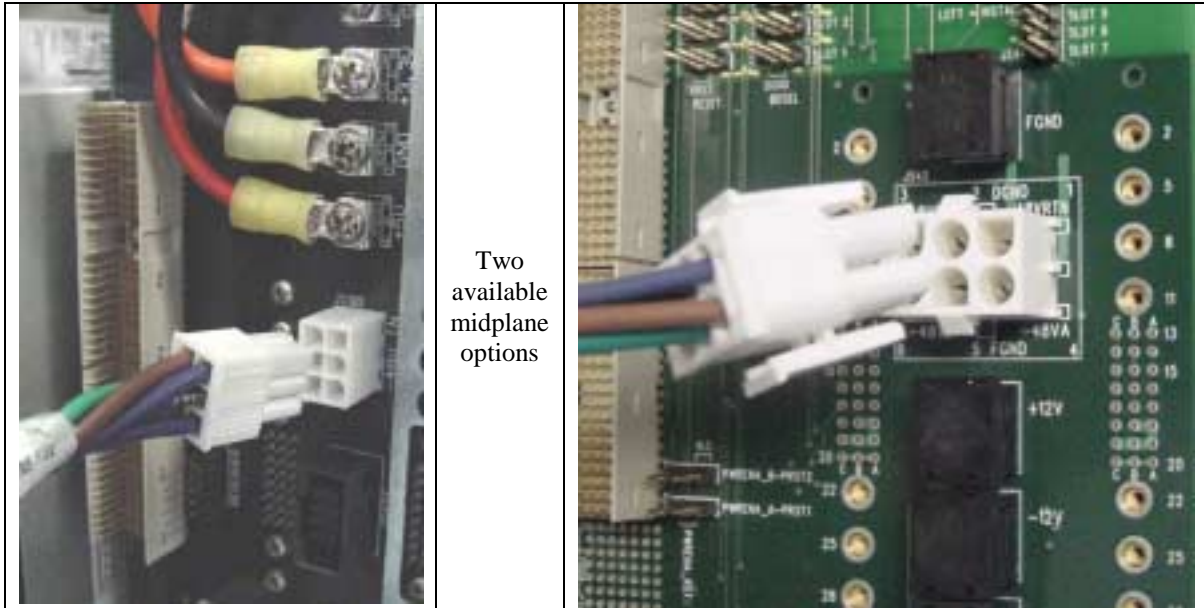
Figure 6   Connecting the Power Input Module connector to midplane

2. Press the Power Input Module faceplate in between the adjacent faceplates and tighten the Module's four captive screws using a #1 Phillips screwdriver.

3. Connect 48V according to the instructions listed in Section 3, "Grounding Your System."

3 Grounding Your System

Definitions of Terms

Earth Ground   Connects to earth to protect from damage due to lightening or static electricity; also establishes a zero voltage reference.

Frame Ground   Grounds the system chassis usually via an external ground pin located on the rear of the rack. Normally connected to Earth Ground.

Digital Ground   The internal circuitry ground used in processor and peripheral cards and other system electronics. This ground may be directly connected to Frame Ground or left isolated depending on your preference.

System Grounding Options

Your system can be grounded in two ways: **connected** or **isolated**. Identify the type of power entry your system has and the grounding option you desire in the diagrams below. Once you have identified your power entry and chosen a grounding option, follow the instructions for grounding your system.

Frame Ground to Digital Ground Connected

Barrier strip power entry

1. *Required:* Connect Frame Ground to Earth Ground using ground wire.

2. *Additional option:* Connect Digital Ground to Frame Ground with metal shorting bar (available from Continuous Computing Corporation).
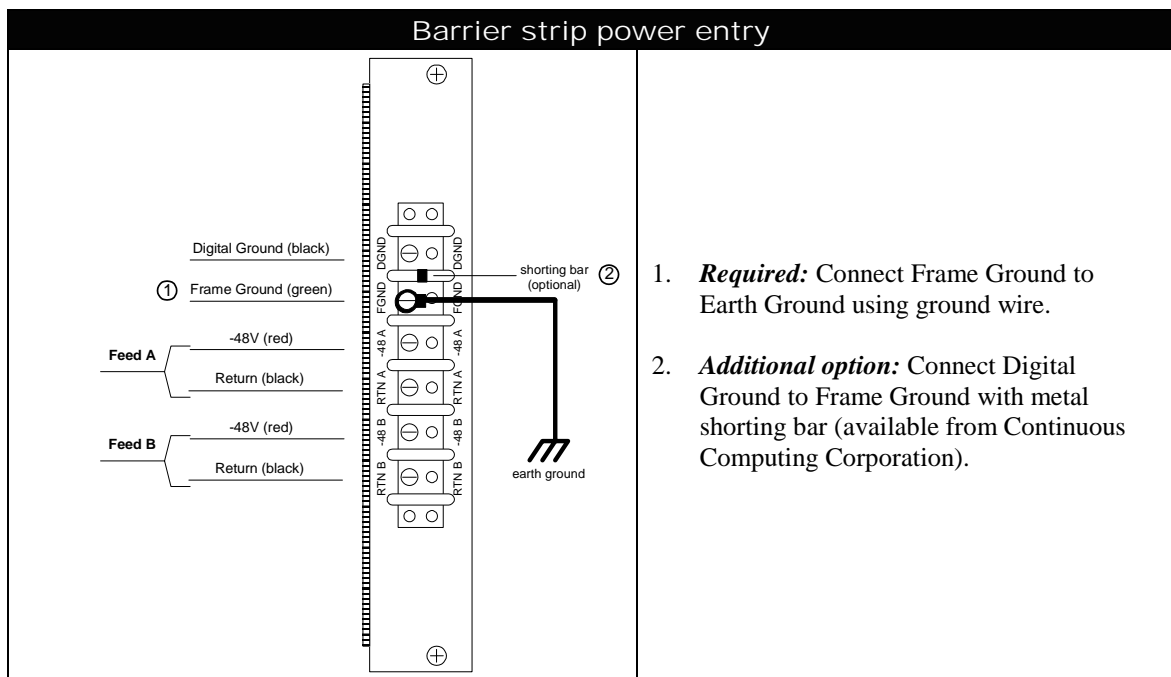
Table 3   Frame Ground to Digital Ground Connected with barrier strip power entry

Power entry connectors

1. *Required:* Connect Frame Ground to Earth Ground with ground wire.
   or
2. Use ground stud to connect to Earth Ground.

3. *Additional option:* Use shorting plug (available from Continuous Computing Corporation) to short Digital Ground to Frame Ground.
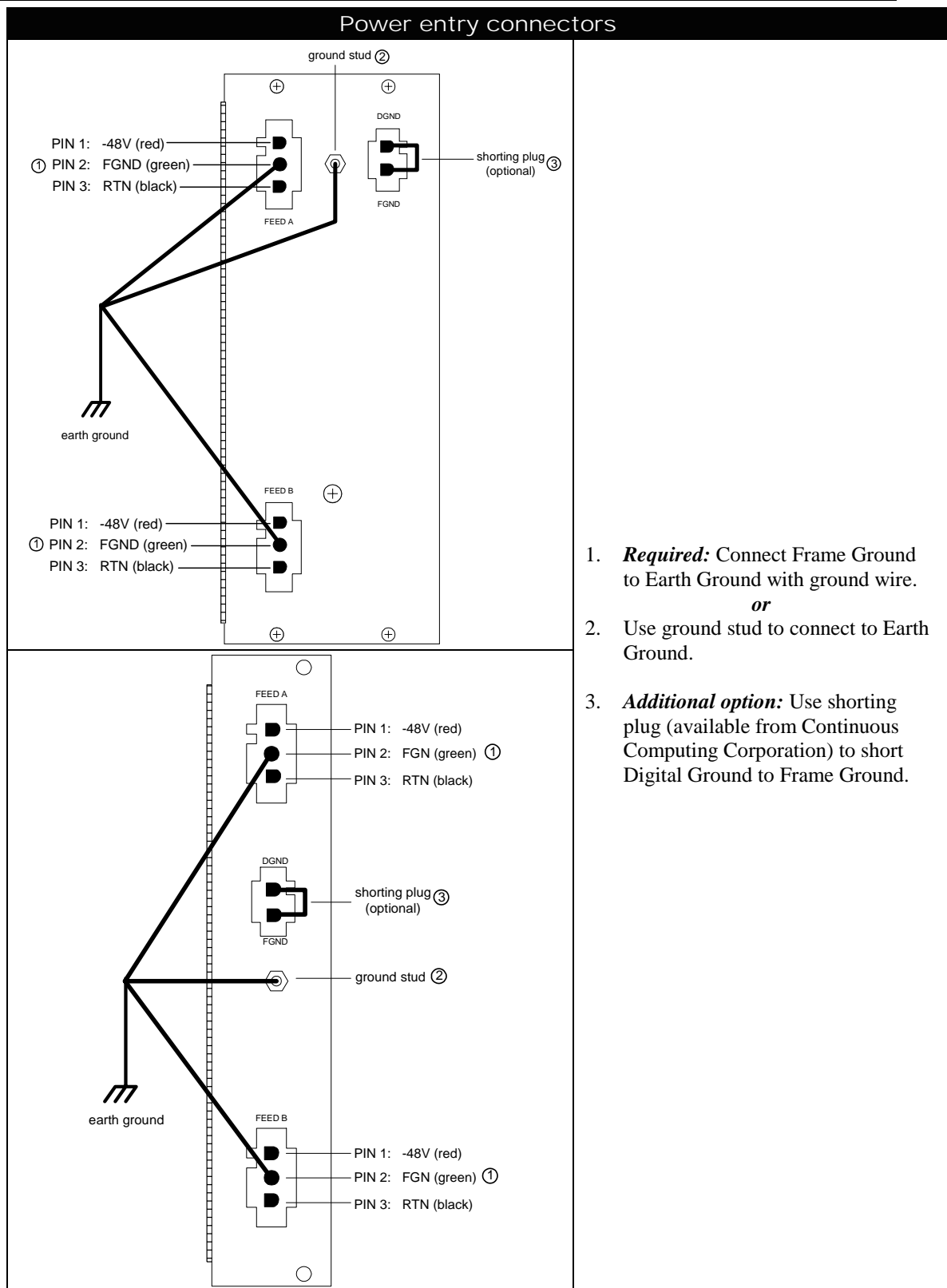
Table 4   Frame Ground to Digital Ground Connected with power entry connectors
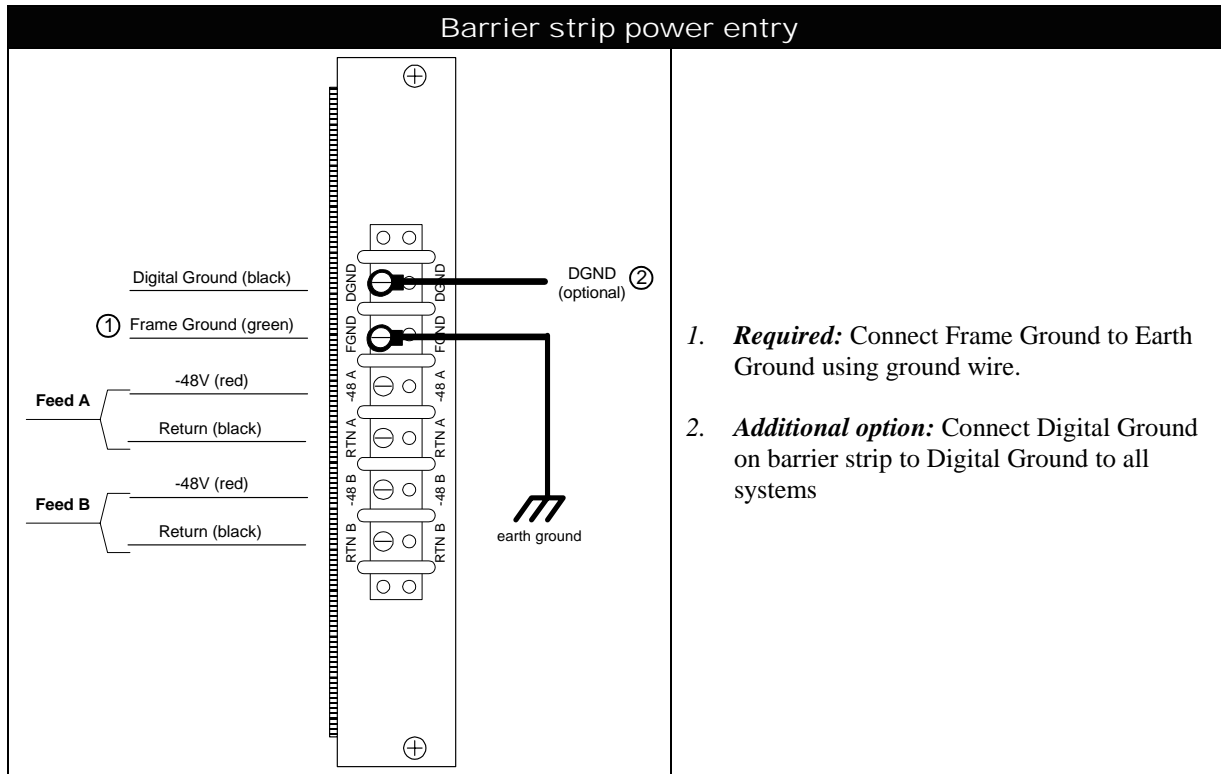
Table 5   **Frame Ground to Digital Ground Isolated with barrier strip power entry**
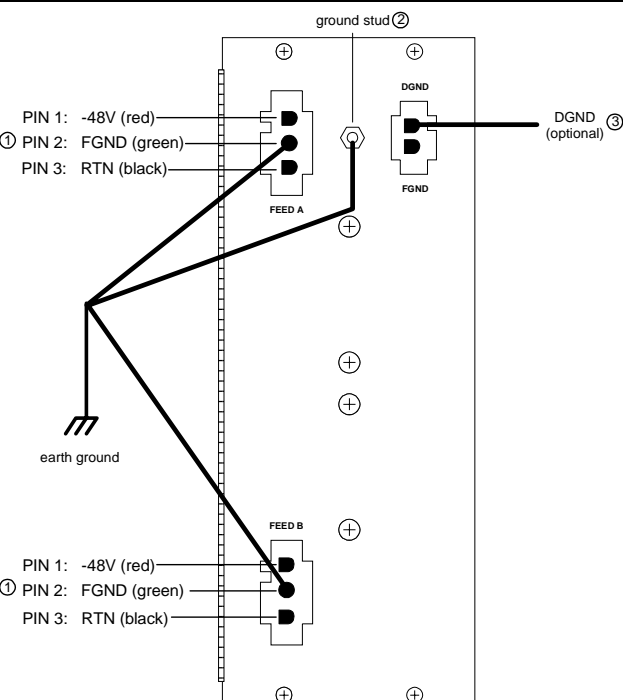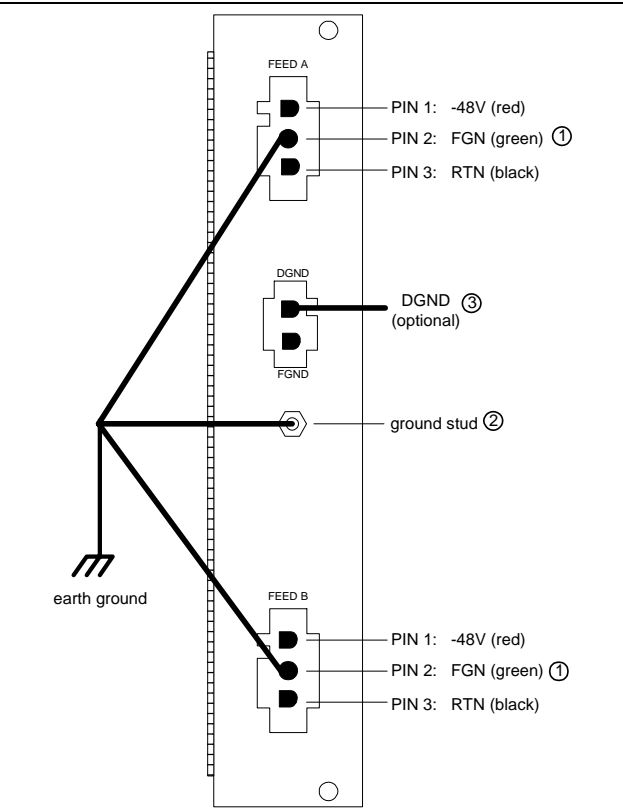
Power entry connectors

ground stud ②

DGND

PIN 1: -48V (red)
① PIN 2: FGND (green)
PIN 3: RTN (black)

FEED A

DGND (optional) ③

FGND

earth ground

FEED B

PIN 1: -48V (red)
① PIN 2: FGND (green)
PIN 3: RTN (black)

FEED A

PIN 1: -48V (red)
PIN 2: FGN (green) ①
PIN 3: RTN (black)

DGND

DGND ③ (optional)

FGND

ground stud ②

earth ground

FEED B

PIN 1: -48V (red)
PIN 2: FGN (green) ①
PIN 3: RTN (black)

1. *Required:* Use ground stud to connect Frame Ground and Earth Ground.
   or
2. Use ground stud to connect to Earth Ground.

3. *Additional option:* Use connector to connect Digital Ground to all systems.

Table 6   Frame Ground to Digital Ground Isolated with barrier strip entry

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Powering On the System

To enable power to your system and, in turn, the Power Supply, you can use two different methods.
- Enabling system from the Continuous Control Node (CCN) front panel
- Enabling system from the Craft console

> ⚠ **Caution – Ensure proper operating temperature ranges are met! Permanent damage to the Power Supply may result from overheating. See Table 8 for operating specifications.**

APP ———————— Application (user defined) LED
ON ———————— On LED
———————— On / Off Toggle Switch
OFF ———————— Off LED

CONS

———————— DB9 Serial Female DCE
Craft Console Connection

CR ———————— Critical Fault LED
MJ ———————— Major Fault LED
MN ———————— Minor Fault LED

RST ———————— Reset Switch (Recessed)
FLT ———————— Controller Fault LED
SWP ———————— Swap OK LED
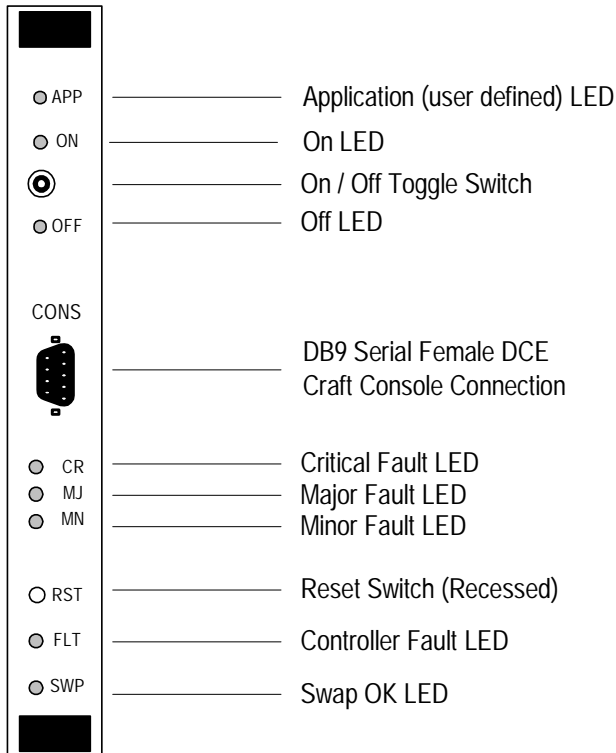
Figure 7   CCN front panel

Enabling system from CCN front panel

1. Locate the On/Off toggle switch on the CCN front panel. See Figure 7 for location details.
   Note: This switch utilizes a locking mechanism to avoid accidental actuation. Pull the switch lever out and push up or down as needed.
2. Pull the On/Off toggle switch lever out and push up towards the ON LED and hold for one second. This will turn the system on.

Enabling system from Craft console

At the `00 ccncli>` prompt, type **on**

Powering Off the System

> ⚠️ **Caution – Before removing power from your system, ensure that the operating system has completely shut down. Failing to do so may cause disk corruption.**

1. Shut down the system's operating system. In Solaris, do this using the **halt** command.
2. Disable power from your system using one of the methods listed below.

Disable system from CCN front panel

- Locate the On/Off toggle switch on the CCN front panel. See Figure 7 for location details. Note: This switch utilizes a locking mechanism to avoid accidental actuation. Pull the switch lever out and push up or down as needed.
- **If CCN daemon is installed and configured for shutdown on the CCN:** Pull the On/Off toggle switch lever out and pushing down towards the OFF LED; hold for one second. The OFF LED will begin to blink. Once the operating system has shut down, the ON LED will go dark and the OFF LED will stop blinking and stay lit.
- **If CCN daemon is not installed on the CCN:** Ensure that the operating system is completely shutdown using the **halt** command. Pull the On/Off toggle switch lever out and push down towards the OFF LED; hold for five seconds.

Disable system from Craft console

- If CCN daemon is installed:

    at the `00 ccncli>` prompt, type **off**

- If CCN daemon is not installed:
    at the `00 ccncli>` prompt, type **forceoff**

4 Troubleshooting

Troubleshooting Scenarios

In the event that the Power Supply should fail in any way, use the following procedures to troubleshoot.

Note: The Power Input Module contains only passive components and therefore is extremely unlikely to be the cause of failure.

Check the LEDs

If the INPUT LED is *not* on, one or more of the following applies:
- The -48V source has not been enabled externally.
- The Power Input Module is not correctly connected or the cables bringing power have improper polarity.
- Both the Feed A and Feed B fuses have blown on the Power Supply. Use the "Check the Fuses" procedure below to determine if the fuses have blown.

If the FLT LED *is* on, one or more of the following applies:
- One of the fuses, or both, have blown. Use the "Check the Fuses" procedure below to determine if the fuses have blown.
- Feed A or Feed B, or both, have lost power from the external source.
- The onboard converters have failed.

Note: The FLT LED will light *only* if the CCN is connected.

Use the Command Line Interface (CLI) or the GUI to the CCN to further troubleshoot the Power Supply and find out whether the problem is external or internal. See the section below, "Use the CCN," to troubleshoot from the CLI.

Use the CCN

If the above conditions have been checked and do not solve the problem, you can use the CCN to investigate the status of the Power Supply. If the CCN is receiving alarm power from a redundant Supply within that system, or from a crossover connection of alarm power from the opposite side of the system—*even if a Power Supply is dead*—the CCN can still be used to determine problems with the Power Supply.

Use the `faults` command

First, login to the CCN and type **faults**. The **faults** command shows what is active at the time, indicating one or more of the following: a Feed A fault, a Feed B fault, or a power converter fault. The output from the **faults** command will look as follows:

```
samplesys ccncli> faults
 # ST  Description
 1 L   Sampled ALM12A out of range (use 'voltages')
 2 L   Sampled ALM12B out of range (use 'voltages')
 8 A   Power Supply A not present
 9 A   Power Supply B not present
```

```
10 L   Disk A not present
16 L   Power Supply A 48V feed A no power
17 L   Power Supply A 48V feed B no power
20 L   Power Supply B 48V feed A no power
21 L   Power Supply B 48V feed B no power
27 A   Application heartbeat not received within timeout period
samplesys ccncli>
```

```
Legend:
A =      Active
L  =      Latched
M =      Masked
```

Note: If the condition causing the fault is current, then the fault is "active". Once the condition has been corrected, then the fault is "latched". Faults can be cleared using the **faults reset** command.

If the power switch on the CCN is used to turn the Supply on or off and the Power Supply's ON LED does not come on when it should, a communication problem between the CCN and the Power Supply has occurred. Therefore, either the CCN or the Power Supply will need to be replaced. To determine which is defective, first try swapping in another Power Supply. If the new Supply does not work, try swapping in another CCN. By doing so, you will be able to figure out if the communication problem is due to the Supply or the CCN.

Use the **voltages** *command*

If the above does not solve the problem, try using the **voltages** command on the CCN to determine whether the currents or temperature are out of range. The **voltages** command lists all sampled voltages and temperatures along with the minimum and maximum values since the last **voltages reset** command (which clears all of the stored min/max values). In addition, the allowable upper and lower limits for each sampled voltage or temperature are displayed.

Output	Indicates
TEMP0	The temperature within the chassis.
ALM12A and ALM12B	The CCN power feeds (ALM12B is only present in multi-node systems).
TEMP1	An extra sensor that is typically not connected.
(the remaining voltages)	The CompactPCI midplane voltages.

Table 7   **voltages** command outputs

Check the Fuses

1. If your system uses a single Power Supply, halt the operating system.
2. Remove the Power Supply from the system. To do this, use the "Removing the Power Supply" procedure below.
3. Using the photo of your Power Supply (see Figure 2, Figure 3, or Figure 4), locate the Feed A and Feed B fuses on your board.
4. With a continuity meter check the fuse *on* the card. If one or both fuses are blown, return the Power Supply to Continuous Computing Corporation for analysis and repair.

Removing the Power Supply

To remove the Power Supply:

1. If your system uses a single Power Supply, halt the operating system. If your system is redundant, skip the next step.
2. Power down the system.
3. Loosen the captive screw on each ejector latch handle to disengage the Power Supply from the system chassis. Refer to Figure 5 for ejector latch handle details.
4. Press the ejector latch handles *away* from the faceplate.
5. Gently slide the module out of the system chassis.

Removing the Power Input Module

To remove the Power Input Module:

1. Halt the operating system.
2. Power down the system.
3. Disable the 48V at the *source* to prevent accidental contact with hazardous voltages.
4. Disconnect the connectors from the panel (ring lugs or 3-pin AMP MATE-N-LOK).
5. Unscrew the panel.
6. Disconnect the 6-pin, keyed Molex connector from the midplane.
7. Remove the Power Input Module.

Contact Technical Support

If you continue to experience problems with your Power Supply, contact the Technical Support team at Continuous Computing. See Section 6 for contact information.

5 LEDs, Connector Usage, and Specifications
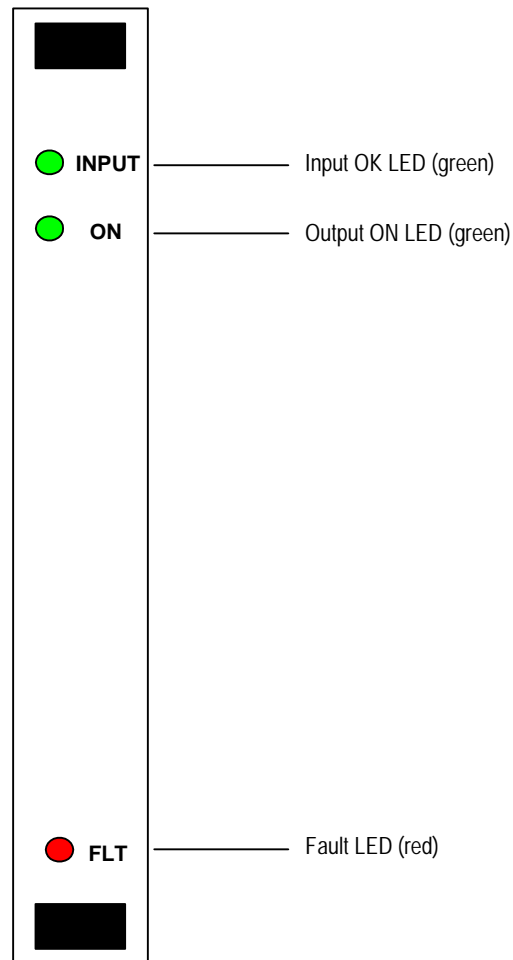
Figure 8   **LEDs for 100W, 150W, and 350W Power Supplies**

LEDs

The INPUT LED

The green INPUT LED is activated when –48V are present on Feed A, B, or both. Whenever the INPUT LED is lighted, the Supply is generating standby power for an attached CCN.

Note: A solder side cover is on the Power Supply. However, if you are ejecting the Power Supply before removing it completely from the chassis, you should wait for the INPUT LED to go completely dark, indicating that any hazardous voltages on the board have been discharged.

The ON LED

The green ON LED is activated when the Power Supply has been enabled to supply 5V, 12V, 3.3V, and –12V to the PCI portions of the system circuitry. Therefore, 48V power can be coming in, but the converters may not be enabled such that they are generating output power from the 48V; this is the distinction between INPUT and ON.

The FLT LED

The red FLT (fault) LED is activated when one or both of the fuses have blown. The FLT LED is activated when Feed A, Feed B, or both, have lost power from the external source or, the onboard converters have failed.

Note: The FLT LED is driven by the CCN. Therefore, if the CCN is not attached, the FLT LED will never light.

Connector Usage

J1000 Pinout

Pin #	A	B	C
1	3V sense -	Fault LED (A)	3V parallel
2	3V sense +	Fault LED (K)	PWR enable
3	RSVD	Feed A detect	5V parallel
4	+12V stby	Feed B detect	5V sense -
5	SDA	DGND	5V sense +
6	SCL	+12V	+12V
7	+12V	+12V	+12V
8	-12V	-12V	-12V
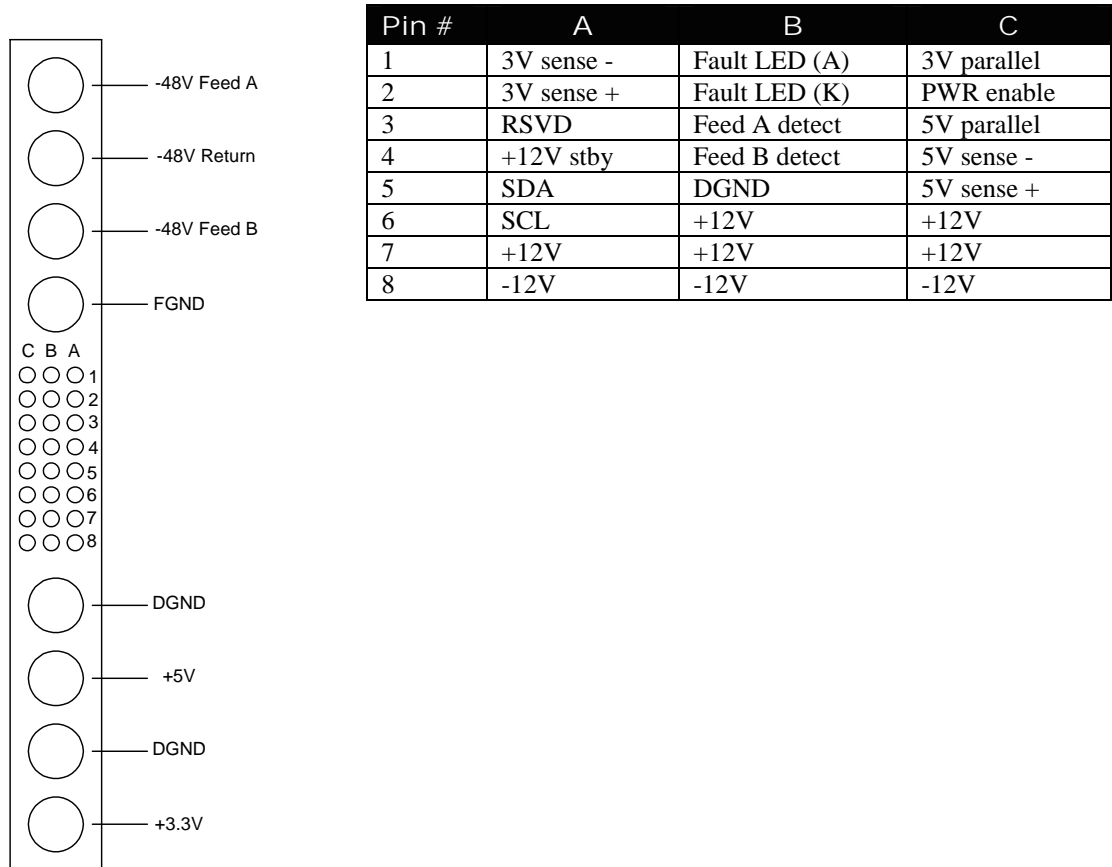
Figure 9   J1000 pinout viewed from board edge

Specifications

Output Current	100W	150W	350W
+5V	12A	30A*	30A
+3.3V	15A	30A*	30A
+12V	6A	8.3A*	8.3A
-12V	0.5A	0.5A	0.5A
Standby 12V	1A	1A	1A

* **Note**: Due to the use of a shared heatsink, the maximum combined power dissipation for +5V, +3.3V, and +12V is 150W.

Output Voltage		
	5V	5.0V ± 3%
	3.3V	3.3V ± 5%
	12V	12.0V ± 5%
	-12V	-12.0V ± 5%
	Standby	12.3 ± 5%

Input Power	Voltage: -42VDC to -56VDC 12A maximum steady state 30A maximum inrush
Front Panel LEDs	Input Power Available On Fault
Connectors	Type M Hybrid DIN

Mechanical	Eurocard 6U		
	100W	**150W**	**350W**
	1 slot	1 ½ slot	2 slot
	160mm x 233mm x 20mm	160mm x 233mm x 30mm *	160mm x 233mm x 40mm

Operating Environmental

Temperature	-5°C to 50°C (Operating)
Humidity	5% to 90% relative humidity, noncondensing
Altitude	3000m
Airflow	300 LFM

Storage/Transit Environmental

Temperature	-40°C to 70°C
Humidity	5% to 95% relative humidity, noncondensing
Altitude	10000m

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Safety Compliance

UL/cUL1950 3rd Edition Recognized Component
UL/cUL1950 Listed (Systems only)
European Low Voltage Directive (Systems only)

Electromagnetic Compatibility

FCC Class A
European EMC Directive (Systems only)

Telco Compliance

Telcordia NEBS GR-63-CORE Level 3
Telcordia NEBS GR-1089-CORE Level 3

Marks

UL, cUL, CE (Systems only)

Table 8   Specifications

6 Technical Support

Before contacting the Technical Support team at Continuous Computing, be sure you have read Section 4, "Troubleshooting," of this guide.

If you continue to experience problems with the Power Supply, please contact the Technical Support team at Continuous Computing by any of the methods listed below.

Note: Please be sure to include the serial numbers for each affected module, system and/or part.

Contacting Technical Support

To contact the Technical Support team at Continuous Computing, do one of the following:

- Email us at support@ccpu.com
- Visit our support web site at http://support.ccpu.com
  (This site features our automatic technical support system. Create a new user profile. Then submit a new ticket at the "Welcome to SupportWizard" page. This process ensures that our team delivers a timely solution to any technical problem you have.)
- Call us at (858) 882-8911, 9:00 a.m. – 5:00 p.m. (PST)

Note: If you have a Gold or Platinum service contract, follow the contact instructions provided with your contract.